ABSTRACT

ELECTROSURGICAL WORKING END FOR CONTROLLED ENERGY DELIVERY

An electrosurgical working end for instant and automatic modulation of active Rf density in a targeted tissue volume. The working end of the probe of the present invention defines a tissue-engagement plane that is adapted to contact the targeted tissue. The cross-section energy delivery apparatus comprises (i) a conductive *surface* engagement plane for tissue contact, (ii) a substrate comprising a *medial* conductive matrix of a temperature sensitive resistive material; and (iii) an *inner* or core conductive material (electrode) that is coupled to an Rf source and controller. Of particular interest, the *medial* conductive matrix comprises a positive temperature coefficient (PTC) that exhibits very large increases in resistivity as it increases beyond a selected temperature, which is described as a switching range. The PTC material is selected and fabricated to define a switching range that approximates a particular thermally-mediated therapy. In a method of use, it can be understood that the engagement plane will apply active Rf energy to the engaged the tissue temperature elevates the medial PTC conductive layer to its switching range. Thereafter, Rf current flow from the core conductive to the engagement surface will be instantly modulated to maintain tissue temperature at the switching range. Moreover, the conductive matrix effectively functions as a resistive electrode to thereafter passively conduct thermal energy to the engaged tissue above its switching range. Thus, the working end can modulate the energy application to tissue between *active* Rf heating and *passive* conductive heating of the targeted tissue to maintain a targeted temperature level.